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ABSTRACT

The paper examines the incidence of minor physical anomalies (MPAs) in 42 normal junior high Ss, 24 kindergarten Ss in a middle class district, 52 status and misdemeanor delinquents, 70 adolescent psychiatric patients, 32 learning disabled children, and 10 autistic children. MPAs included facial asymmetry, epicanthal folds, and geographical or fissured tongue. Analysis of complete blood chemistries and neuropsychological examinations revealed that MPAs varied significantly among the groups surveyed. The value of each of the blood measures as predictors of acting out behavior was enhanced by its association with the number of MPAs. Normal junior high and kindergarten Ss had fewer MPAs than all others studied: status and misdemeanor delinquents had fewer MPAs than psychiatric patients and learning disabled or autistic Ss. Autistic Ss had more MPAs than all the other groups. (CL)

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MINOR PHYSICAL ANOMALIES

An Indication of Biological Lesion in Psychiatric Patients

PAPER DELIVERED AT

SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT

SHERATON-BOSTON HOTEL

2 April 1981

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MINOR PHYSICAL ANOMALIES:
An Indication of Biological Lesion in Psychiatric Patients

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ABSTRACT

Price reported that preindustrial populations had few or no dental and facial anomalies. Such anomalies appeared quickly after the introduction of the foods of industrial civilization. Hooton found significantly more minor physical anomalies (MPA) in 17,077 criminals than in controls. Many authors have found more neurological anomalies and diseases in criminals than in normal populations.

Waldrop and others surveyed large numbers of children and found MPA associated with hyperkinesis in boys and hypokinesis and dysphoria in girls. This paper surveys the recent literature on MPAs.

42 normal junior high school age gym students; 244 kindergarten pupils in a middle class district; 52 status and

misdemeanor delinquents; 70 adolescent psychiatric patients; 32 markedly learning disabled children; and ten autistic children were examined by three independent teams of evaluators for the presence of 14 MPA.

Normal junior high school students and kindergarten pupils had fewer MPA than all others studied; status and misdemeanor delinquents had fewer MPA than psychiatric patients and learning disabled or autistic children. Autistic children had more MPA than all the other groups (all of whom were less profoundly ill).

MPA varied by diagnosis, dietary practices of family, and on a range of objective biological assays. The hypothesis that delinquency and psychiatric injury are associated with biological anomalies such as MPA is supported by these data. Trauma may more severely injure individuals with greater numbers of MPA.

INTRODUCTION

Lombroso's notion that criminals are atavistic degenerates who bear physical characteristics infallibly denoting crminality was refuted by Charles Goring's study of 2000 English undergraduates. Goring's subjects had just as many of Lombroso's physiognomic peculiarities as imprisoned felons (Lange, 1930). Subsequent theories linking biology to criminal behavior have generally avoided Lombroso's moralistic tone; while trying to emulate his notion of systematic data collection and testability of ideas.

The Jukes (Dugdale, 1877) are the classic example of a criminality persisting in a family through generations. Idential twins are much more likely to be criminal than fraternal twins, even when raised apart (Lange, op cit). Children of criminals separated in infancy from their parents and their natal milieu are more likely to be criminals than adopted children of noncriminals (Newkirk, 1957; Crowe, 1972; Schulberger, 1972). Genetic influences play an important role in the etiology of delinquency (Henderson, 1939; Karpman, 1961; Trasler, 1962; Eysenck, 1970; Rosenthal, 1972).

Central nervous system (CNS) disease has been

diagnosed in as many as 75% of criminals (Thompson, 1951) and many authors find more CNS lesion and dysfunction in criminals than normals (Quay, 1965; Eysenck, 1970; Hare, 1970; Lidberg, 1971; Goldman, 1972; Pontius, 1972; Jeffery, 1972; Watenberg, 1973). Other constitutional lesions are associated with delinquency (Stott, 1962; Nielsen and Tauboi, 1970; Cortes & Gatti, 1972; Lindzey, 1973). Berman and Siegal (1976) and von Hilsheimer (1977) independently found that delinquents are much more likely than nondelinquents to have psychoneurological deficits and learning disabilities.

Hooton (1939) examined 17,077 criminals and found that they were quite different from normals in the frequency of minor physiognomic features. Price (1945/1970) noted this fact, reporting a number of provocative case reports relating to endocrine consequences and criminal behavior relating to minor facial anomalies.

In 1945 Price (ibid.) reviewed his field studies comparing isolated and modernized folk of eleven different racial stocks before and after introduction of the foods of industrialism. He reported a significant increase in anomalies of the face, palate, and teeth in children born after the introduction of white flour, refined sugar, and processed foods. Price found a number of isolated communities where war or fluctuations of the market caused a reversion to

preindustrial diet for a number of years. In every case the children had no anomalies if they were born a year or more after the last of the foods of industrialism were available.

Price examined isolated Swiss, Gaelic, Eskimo, Amerind, Melanesian, Polynesian, African, Australian, Torres Stait Islanders, Maori and Peruvian people and compared them to their cousins living in the modern network of commerce. When he examined the teeth and palates in thousands of skulls of these folk he found that the older skulls did not have dental and boney anomalies of the face and mouth and had few caries. Anomalies and caries appeared after the introduction of the foods of industrialism.

Von Hilsheimer and Kurko (1979) reported that children from lower income neighborhood schools have more MPA than those from middle income neighborhood schools.

In a review of the association between minor physical anomalies (MPA) and illness and morbidity, Marden, Smith, and MDonald (1964) concluded that the presence of three or more MPA indicates that a major anomaly is likely to be present. Smith and Bostian (1964) reported that as few as one to three MPA may indicate significant alteration in embryonic development. Binkley (1970) found more MPA in allergic children than in other pediatric patients.

Goldfarb and Botstein (1956) found that schizophrenic children had more MPA than general pediatric patients. Von Hilsheimer (1970), Campbell and his associates (1978), and Walker (1977) replicated this observation in severely emotionally ill, psychotic, and autistic children. Daryn (1961) noted that 86 children with diffuse brain damage had an unusual number of MPA.

In the first of seven studies by Mary Waldrop and assocates, hyperactive boys were found to have more MPA than others, while girls with many MPA were more inhibited and intractible (Waldrop, Pedersen & Bell, 1968). A second study (Waldrop & Goering, 1971) replicated the first report; emphasizing that high MPA boys tended to be hyperactive while high MPA girls tended to be socially inept. This second study reviewed 62 of 74 children five years after the original report, and showed that the prediction of behavior by MPA was very stable. In another study 31 boys and 10 girls referred for speech and hearing problem were found to have many MPA (Waldrop & Halverson, 1972). A comparison of 46 of the most hyperactive pupils (out of 775) with 44 nonhyperactive pupils showed more MPA in hyperactive boys than in girls, and the rank of judged hyperactivity correlated positively with the number of MPA (Waldrop & Halverson 1971). A comparison of 40 inhibited, social inept girls with 54 outgoing, socially

competent girls found that the fewer MPA the more likely the girls were to be well coordinated and intelligent and the less likely to be absent from school (Waldrop, Bell & Goering, 1976). Studies also showed an accurate prediction of hyperactity and short attention span, aggression, and impulsivity in boys at age 3 by an MPA count at birth (Waldrop, Bell & McLaughlin, 1978) and an accurate prediction of inhibition, short attention span, unfriendliness, and low scores in a number of skills by age 3 by an MPA count in girls at birth (Waldrop 1979).

Waldrop's studies on hyperactive boys have been replicated by Rapoport and her colleagues (1974a, 1974b, 1975). She reported that MPA were not associated with attractiveness, but were associated with morbidity, complications of pregnancy, paternal hyperactivity, and biochemical anomalies. In these studies Rapoport examined the issue of subjectivity of certain MPA and observer bias due to unusual or unattractive appearance. When photographs were sorted for attractiveness the unattractive children had no more MPA than the attractive. In these studies the interrater reliability was high.

From a sample of 1,000 newborns, Quinn, Renfield, Burg, and Rapoport (1977) selected 147 with many or few MPA. Those selected differed in irritability at 1 year of age, in

temperament at 2 years and on 12 items of behavior excluding hyperactivity (especially boys) at 3 years (Burg, Har, Quinn & Rapoport, 1977).

Steg and Rapoport (975) found that learning disabled pupils and serious mentally ill children had more MPA than patients in a general pediatric ward and children who were psychiatric outpatients.

Halverson and Viccor (1976) found many MPA in children with behavior problems. Girls were perceived by their peers as mean, noisy, and least desireable as seat mates when they had many MPA. The peers of boys with many MPA thought they were poor at games, and professionals judged them to be hyperactive. Firestone and coworkers (1976,1978) found MPA to be associated with hyperactivity, retardation, and with the number of MPA in parents and siblings. Durfee (1974) found crooked ears associated with the "bad boy syndrome".

Lerer (1977) found that of 307 children referred to a clinic, 226 were distracted, impulsive and restless and exhibit a short attention span. Compared to 452 matched controls, these 226 had two to three times the frequency of two MPA, the single palmar crease, and the Sydney line (a palm crease first associated with allergy in Sydney, Australia).

METHOD

Population

In this study we examined:

all of a normal 4th period gym class in the DeLand (Florida) Junior High School. These 42 students were representative of the generality of students and this is the only Junior High School for the community;

all of the kindergarten pupils (244) in one middle class district of Fort Worth, Texas;

all of the status and misdemeanor delinquents (52), who were not recidivists and who had no learning disability who were in residence at Green Valley Psychiatric Hospital from September 1972 through August 1973;

all of the learning disabled delinquents (70), most of whom had committed felonies, who were in residence at Green Valley Psychiatric Hospital from September 1972 through August 1973;

all of the children (32), at Briarwood, a private day school for markedly learning disabled children in Houston, Texas;

ten autistic children whose parents are members of the Houston chapter of the National Society for Autistic Children.

Except for 14 of the junior high school students, all the children in the study were from middle-class homes.

Anomalies

We limited the list of MPA to 14:

1) facial asymmetry;
2) two or more hair whorls with fine 'electric' hair;
3) ears set so that the top edge is at least 1 cm below a line drawn horizontally through the pupil and dorner of the eye, or set so that the point where the lobe attaches to the ear is 1 cm below a line drawn through the mouth;
4) hypertelorism or hypotelorism -- tear ducts more distant than 2 s.d. from the mean for age peers;
5) epicanthal folds - the skin at the inside corner of the eye completely covering the tear ducts;
6) highly arched or steepled palate;
7) geographical or fissured tongue;
8) irregular, crowded, or malformed teeth (or a history of ortodontal correction);
9) fifth finger short and abruptly curved inward;
10) index finger as long as or longer than the ring finger;

11) single palmar crease (the so-called simian crease), or the Sidney line;
12) aged appearance of the back of the hands;
13) a gap 1 cm or more between the great and second toes;
14) third toe equal in lenghth or longer than the second toe, or third and fourth toes equal in lenghth, or second toe longer than the great toe.

Judgements

The author observed Binkley evaluate his patients; the author and a senior colleague observed Rapoport evaluate an accidental sample of patients at the Georgetown University Medical School. Two of us simultaneously trained eight aides by demonstrating the procedure on 120 retarded children not reported in this study; these aides then evaluated the elementary pupils. The author trained three teachers, who evaluated the junior high students and the residential delinquents who were then evaluated again by the author. The special day school students and the autistic students were evaluated by the author alone. Palm prints and photographs of pupils were independently scored by the author and a senior colleague.

The placement of the ears and the distance between tear ducts were directly measured on the child and from

photographs. Finger and palm anomalies were scored from prints as were anomalies of toe lenghth and gap. Anomalies of facial symmetry, palate, tongue, teeth, appearance of the back of the hand and "electric" hair were judgements of the team.

Overall, the intraclass correllation was significantly high at .90 and did not drop below .82 for any anomaly. Bartlett's test of homogeneity gives an insignificant B statistic (Chi Squared = .97 at 3 df, p = .80) for the variance among the raters. MPA appear to be objective phenomena that can be assessed reliably by various observers.

BLOOD CHEMISTRIES

Complete blood cell counts were done on the adolescents in residential care, as were measures of the ratio of cholesterol to phospholipid (von Hilsheimer, 1977).

NEUROPSYCHOLOGICAL EXAMINATIONS

Twenty-seven separate psychophysiological tests and measurements were carried out on the adolescents in residential care, as were a number of paper and pencil tests (ibid).

RESULTS

MPA varied significantly among the groups surveyed.

The most normal children - junior high and public kindergarten pupils - had the fewest MPA; status and misdemeanor delinquents had more MPA; learning disabled delinquents had even more MPA; special day school pupils had more MPA and autistic children had the most MPA of all the groups surveyed. MPA seem to be associated with on a continuum of psychopathy in an inverted "U" shaped function. Increasing numbers of MPA are associated with increasing risk of active delinquent behavior until the number of MPA become very high and then behavior is inhibited and bizarre rather than criminal.

The frequency of MPA by groups is displayed in Table I, and the statistical analysis of the frequency distribution is shown in Table II. A graphic display of the distribution is shown in Figure 1.

Tables I&II and Figure 1 Here

MPA And Diagnosis

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We compared MPA (using a list of 16) among 81 residents of a treatment center for adolescents. Figure 2 a frequency distribution of the number of MPA compared among accidental controls; dysphoric status delinquents who did not commit felonies and who had normal school skills; learning disabled delinquents (both status and felony criminals); and those who required more than 5 years of institutionalization or imprisonment after discharge. Using Kruskal and Wallis's nonparametric Analysis of Variance, H (3) = 16.969 ($p < .001$).

Figure 2 about here

MPA, Blood Cells and Blood Lipids

==========

We did a computer pattern analysis on the complete blood cell count, the blood cholesterol, phospholipids and free fatty acids, and MPA.

A pattern emerged where low numbers of MPA; a high ratio of polysegmented cells to lymphocytes; few eosinophils

or monocytes; a low ratio of phospholipids to cholesterol; but high phospholipid and high cholesterol considered separately; and low free fatty acids were associated with cooperativeness in residential care and no or low recidivism.

A large number of MPA; low polysegmented cells to lymphocytes; many eosinophils or monocytes; a high ratio of phospholipids to cholesterol, or relatively little of either lipid considered independently; and high free fatty acids were associated with passivity in residential care and high recidivism.

Acting out delinquents, uncooperative with care, and with moderately high recidivism fell into a cluster between the extremes.

The value of each of the blood measures as predictors of acting out behavior was enhanced by its association with the number of MPA.

The results of this pattern analysis are displayed in Figure 3. When six diagnostic groups are compared the weighted scores given by blood cells, blood lipids and MPA yields an H (5) of 27.126 ($p = <.001$).

The accidental controls were significantly different

from the delinquent population (Wilcoxcn's Sum of Ranks, z = 4.45, p = <.0001).

When this pattern was compared to staff records of patients who acted out in residence the pattern predicted cooperativeness in the center with a k coefficient of agreement (Cohen's) of .82 (p = <.0001).

MPA and Psychophysiological Measures

MPA most significantly predicted the likelihood of patients to fail to condition a galvanic skin reflex (chi squared (1) = 13.665, p = <.005; combining probabilities from phi correlations); to fail to condition an eye blink reflex (chi squared (6) = 14.391 where 14.449 is required for p = <.05); and quicker reaction time (p = <.02). The combined probability of MPA with poor performance on the 27 tasks could occur by chance less than 1 in 1000 occurances.

DISCUSSION

Hooton and Price observed physiognomic anomalies before and during World War II and gave compelling evidence for a biogenic basis for delinquency. However, attention to the minor anomalies of the face seems to have been awaiting

Mary Waldrop's intensive work in the last decade, and she cites neither author in her work. The evidence from Price supports the idea that diet is a major cause of MPA and the deficiencies associated with them.

Nutrition is not the only vector by which stress is mediated, although in an extensive review of many causes of morbidity Pasmaniak and Knobloch (1966) concluded that background dietary stress seems to be the functional framework within which other lesions operate. Von Hilsheimer (1977b) reviewed a large number of studies which associated CNS dysfunction, MPA, and marginal nutrition.

Stott (1973) found that poverty's effects seem to be mediated through "severe continuing personal tensions (in particular marital discord ...)" that result in "...child morbidity in the form of ill-health, neurological dysfunction, developmental lag and behavior disturbances" (p. 785). Stott ruled out previous illness, accident, work stress, dental operations in mothers, death or illness of family members, shocks and frights (to the child or expectant mother), prenatal maternal illness, short gestation, or complications ofelivery. "Low socioeconomic status and adverse environment we not significantly related to child morbidity if there was norenatal marital tension" (ibid.).

Stott reported in 1962 that unusual physical stresses experienced by some English families during the Blitz predicted delinquent behavior. These effects were mediated in a complex fashion. Stott (1973, p. 785) concluded that "continuous personal tension in pregnancy may be characteristic of population pressure."

On the other hand, a study by Winick, Meyers and Harris (1975) suggest that early malnutrition has very persistent effects. Korean orphans adopted into uppper-middle-class (UMC) American homes have higher IQ's and higher academic achievement than the averge child in the UMC milieu. The Korean orphans who were malnourished before age two also have higher IQ's and academic achievement than the UMC average; but these Korean orphans are significantly less bright and achieve less than Korean orphans who were well fed before age two. Despite marvelous rehabilitation, the effect of early malnutrition persists.

Von Hilsheimer (op cit), Barron (1979) and Schauss (1979) report that the diet of delinquents is different from that of nondelinquents in being high in milk, carbohydrates, highly processed foods and sugar. Stott did not examine the issue of nutrition, and it may be that high incidence of minor illnesses he reported in delinquents, the high incidence of MPA in delinquents we find, and the poor performance of

delinquents on psychoneurological tasks (Berman and Seigel, 1976, von Hilsheimer, 1977) are nutritionally conditioned. It may be that population pressure, persistent marital discord, and prenatal stress are functions of food preference and constitutional inadequacies in digesting food. Further research on MPA and biochemical anomalies may hasten the resolution of what may not, after all, be an inconsistency in the literature.

Many studies have associated MPA with morbidity and deviant behavior. Our study shows that behavior problems are moderately associated with MPA; delinquency and learning disability are strongly associated with MPA; and severe psychiatric casualty is highly associated with MPA. The conclusion is escapable that a biological process causes MPA and delinquency.

We think the seminal work of Hooton, Price and Waldrop has now been sufficiently replicated to show that MPA assessments ought to be a standard correctional procedure. At he very least, high MPAs are associated with high morbidity and ought to command greater attention from dieticians and physicians. It may be that delinquents with a high number of MPA will not be responsive to correction unless medical treatment and special diets are given. Weighting other less objective or less statistically significant evaluations by the

number of MPA may improve predictions of recidivism.

MPA are ideal objects for investigation. Reliability is high and assessments are inexpensively made. Prospective studies of the interaction of nutrition, prenatal family discord, MPA, and subsequent delinquency and morbidity should be very productive. Unfortunately, neither Stott nor Waldrop has looked at the interaction of nutrition, MPA and morbidity.

MPA apparently result from a high intake of empty calories and a deficiency of micronutrients. It seems reasonable to assume that unremitting population pressure, continuous family discord, and other stresses increase the demand for energy and the ability to digest food. A simple positive feedback relationship may exist between nutrition and other stresses. Price's work is timely despite the fact that some of the observations were made 50 years ago. His objective series of skulls and dental plates taken in unambiguous circumstances raise grave suspicions about the foods of commerce.

It seems inarguable that psychopatholgy is rooted in biochemical processes and is no mere social phenomenon. The attention of our profession must be directed to the biological roots of criminality and psychosis and MPA are a reliable and

valid tool for this needed work.

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TABLE I

Frequency of MPA by Group

Group	No. (%) with 2 or fewer MPA	No. (%) with 3 or more MPA	Total
Junior High	33 (79)	9 (21)	42
Kindergarten	197 (81)	47 (19)	244
Delinquents	22 (40)	30 (60)	52
Felons	9 (13)	61 (81)	70
Special Ed	3 (9)	29 (91)	32
Autistic	0 (0)	10(100)	10
Total	264	186	450

TABLE II

STATISTICAL COMPARISON

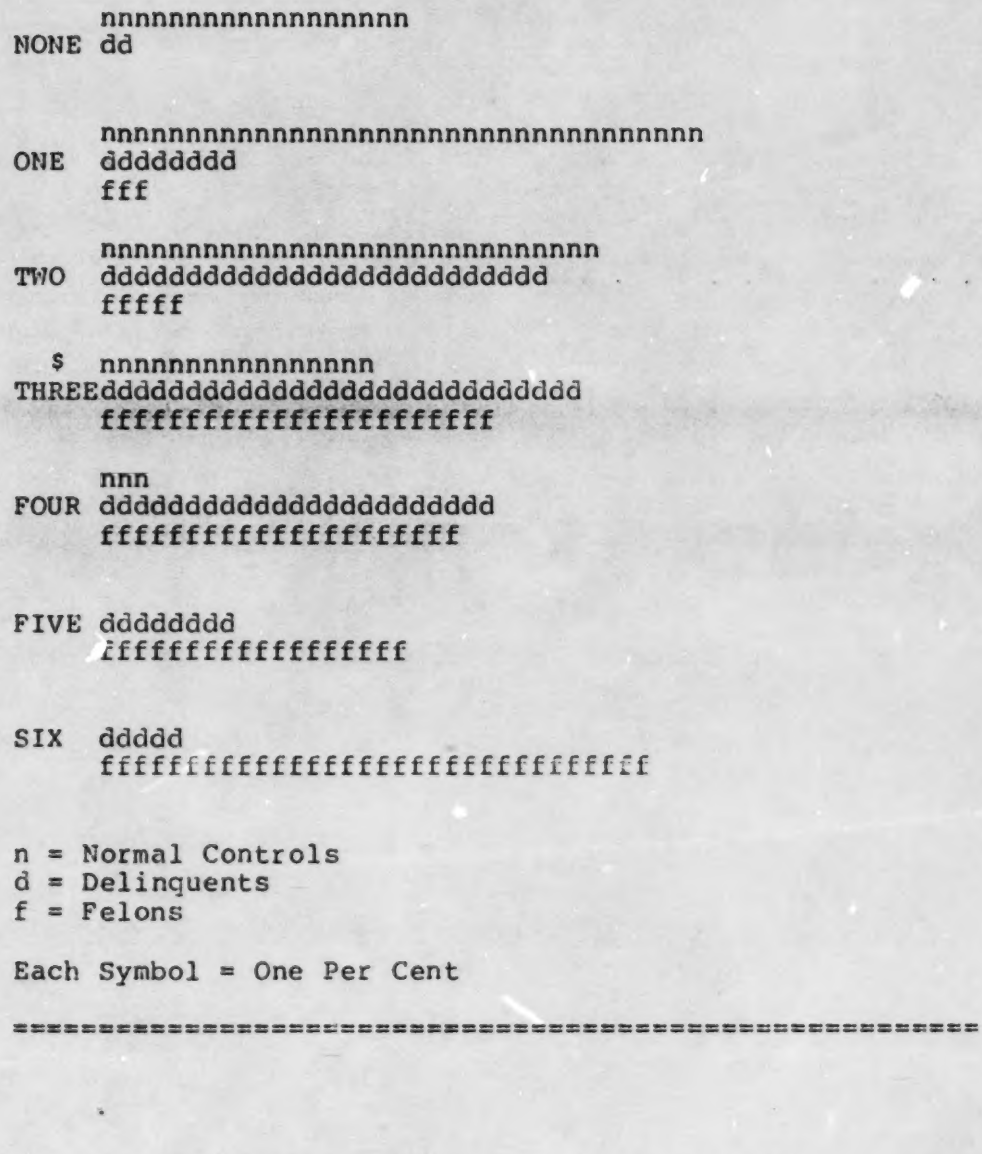
GROUPS	$2X^2$ CHI	PROBABILITY
JHS vs K	.107	n.s.
K&JHS vs AO	153.136	.001
K&JHS vs D	33.691	.001
K&JHS vs F	116.343	.001
D vs F	13.654	.001
F vs SE	.257	n.s.
D&F vs AU*	3.321	.08

JHS = Junior High School
K = Kindergarten
D = Delinquents
F = Felons
SE = Special Education
AU = Autistic

* If zero cases of fewer than 4 MPA among the autistic children is considered as a Bernoulli distribution, then $z=3.27$, $p=.001$; the autistic children have significantly more MPA than the felons and special education children.

FIGURE I

PER CENTAGE OF MINOR PHYSICAL ANOMALIES
CONTROLS, DELINQUENTS, FELONS



n = Normal Controls
d = Delinquents
f = Felons

Each Symbol = One Per Cent

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Figure 2

Minor Physical Anomalies
Compared Among Delinquents

Number of MPA	Controls	Status	LD	Recidivists
1				
2	111			
3	1	11		1
4	1	1111		11
5	111		111	111
6	1	1	11	1111
7		1111	111	11
8		1	11111	11
9			1111	1111
10	1	11111	1111	111
11		1	111	1
12			111	1
13			1	
14				1